CERES Interests for CLAMS Flights

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Summary on this page, then 1 page of notes, 3 pages of flight cartoons about OV-10, 2 pages of figures (6S theory) by Wenying Su (w.su@larc.nasa.gov) show need for low altitude for CV-580 CAR BRDF (600ft has been selected; last 2 figs show 600m~1800ft).

Many OV-10 for limited areas 1.25x2.50nm at 600ft

Each flight in a clear patch

2 patterns: 1 includes COVE, 2nd few nm to NE

Many NOT at Terra overpass to cover various SZA

Objective: scale up COVE point measurements to a MODIS pixel

Limited CV-580 for CAR BRDF at 600ft with AOT

Very clear only for BRDF; clear patches OK for AOT

Simultaneity with Terra NOT essential

Priority locations

Region few nm NE of COVE

Buoy 44014 (64nm off Va Beach) best ocean wave data

Blue ocean (Buoy 41001) simult. AVHRR backscattering

Objective: Translate CLAMS-COVE sea optics to the broader ocean, validate CERES surface boundary conditions and AVHRR AOT for GACP

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Objective: scale up COVE point measurements to a MODIS pixel. We have continuous observations at COVE, but they cover only a single point. The OV-10 observations will permit us to relate that point to the larger scale of a MODIS footprint. With this relationhip (point at surface to area at surface) established for a few cases during the campaign, we plan to interpret the routine, daily COVE observations to the scale of a MODIS pixel at the surface, eventually characterizing MODIS for numerous conditions of sea state, wind, aerosol loading, etc. With the MODIS scale then solved , we can then scale MODIS to the big CERES footprints. Note that the 1.25x2.5 nm box contains a few MODIS pixels, enabling tests of the surface gradients inferred fromMODIS TOA data.

Limited CV-580 for CAR BRDF at 600ft with AOT

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Priority locations

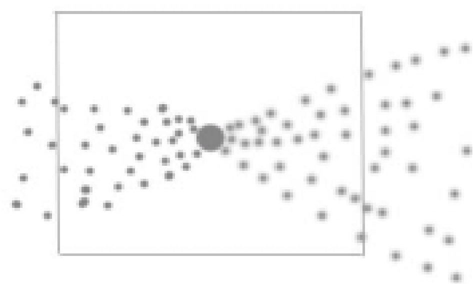
Region few nm NE of COVE
COVE itself is contaminated by boats. SP1-A makes BRDF-like measurements at COVE continuously.

Buoy 44014 (64nm off Va Beach) best ocean wave data
44014 is the only buoy in the vicinity with accelerometers that measure the respective orientations (direction), heights, and periods of both wind waves and swell waves (these affect BRDF). Like the other buoys, 44014 measures winds and temperature.

Blue ocean (Buoy 41101) simult. AVHRR backscattering
Blue ocean is identified by SeaWiFS concentrations of ~0.5 mg/m**3. The critical CAR BRDF observations are the transfer tool for interpreting sea optics data taken near COVE in terms of the broader ocean. Very clear is required for the BRDF. AOT observations would validate AVHRR retrievals. We seek simultaneity with NOAA16 overpass; hence this flight will not overly tax the more valued flight time close to Terra overpass. We seek backscattering at moderate VZA (July 16, 17, 18, 26, 27, and 28). Observations concident with SeaWiFS overpasses (see CLAMS satellite page) would be good to have, too.

Objective: Translate CLAMS-COVE sea optics to the broader ocean, validate CERES surface boundary conditions and AVHRR AOT for GACP CERES treatment is presently very simple (i.e., no surface wind speed dependence in cloud retrievals over the ocean). These observations will permit us to determine the consequences of those assumptions; and to generate more advanced products with higher accuracy.

What do the sea platform measurements at COVE (center of 1.25x2.50nm box) represent? How can we manipulate continuous observations at a point so as to represent a larger area?



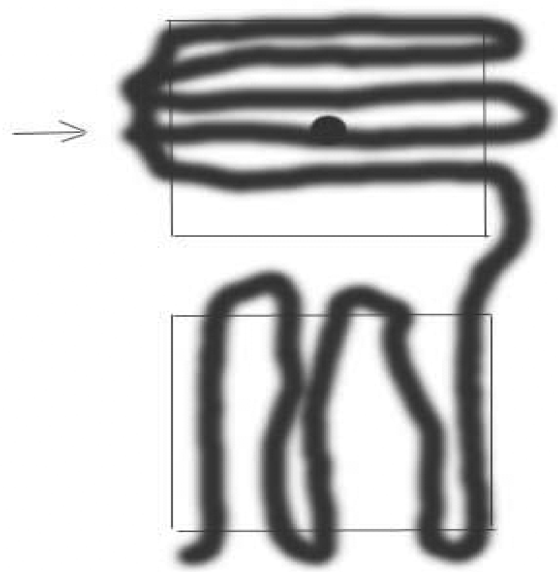
< < < <
< < < < sea current
< < < <

Sea current moves bubbles downstream from COVE, creating anomalous reflection at left.

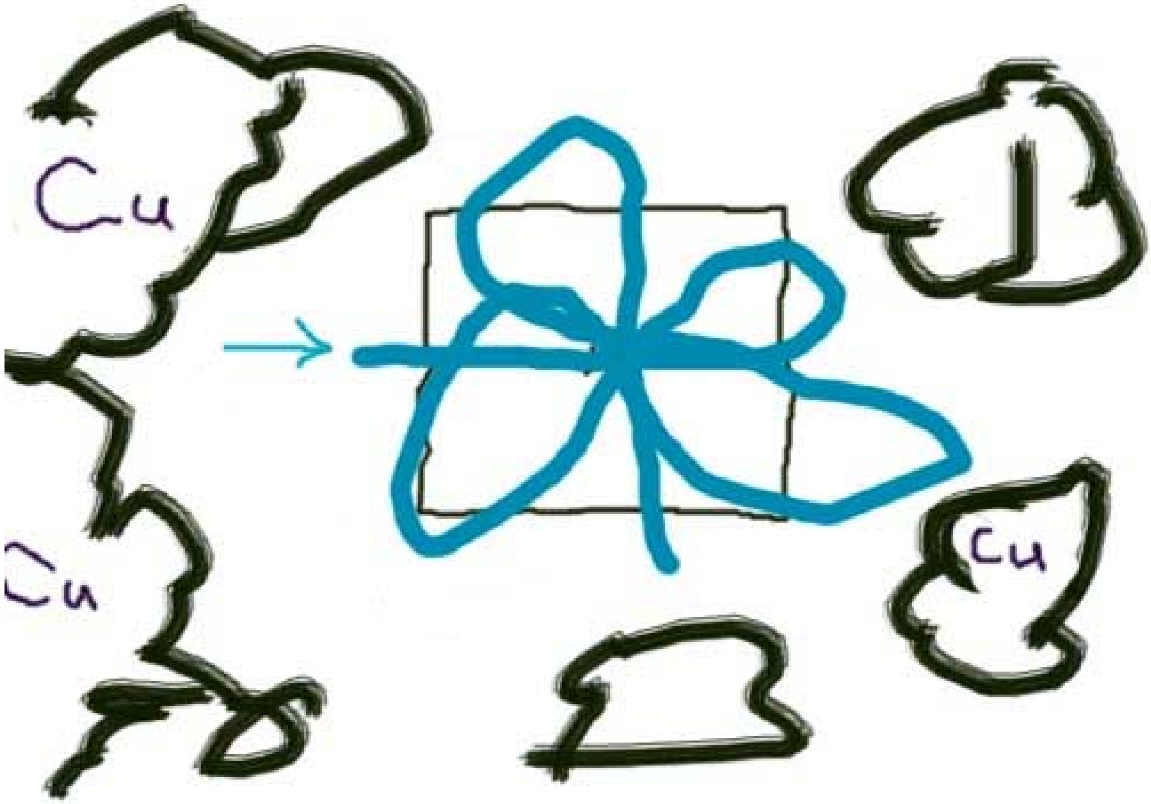
>> >> >> >>
wind >>
>> >> >> >>

Wind blows spray to the east of COVE, creating anomalous reflection at right.

Because COVE may affect the sea within a nm or so, our flights must include nearby regions. OV-10 observation of upper box (with COVE at center) and nearby lower box are depicted below. Here the altitude is 600ft ASL, so each 1.25x2.5nm box is well observed with a traverse of 5 lines. Which box (upper with COVE or lower without) should be simultaneous with Terra overpass? This will be our basic pattern. The alternates would be permutations of (a) 1.25x2.5nm box at 600ft ASL with COVE and (b) 1.25x2.5nm box at 600ft ASL in nearby sea.



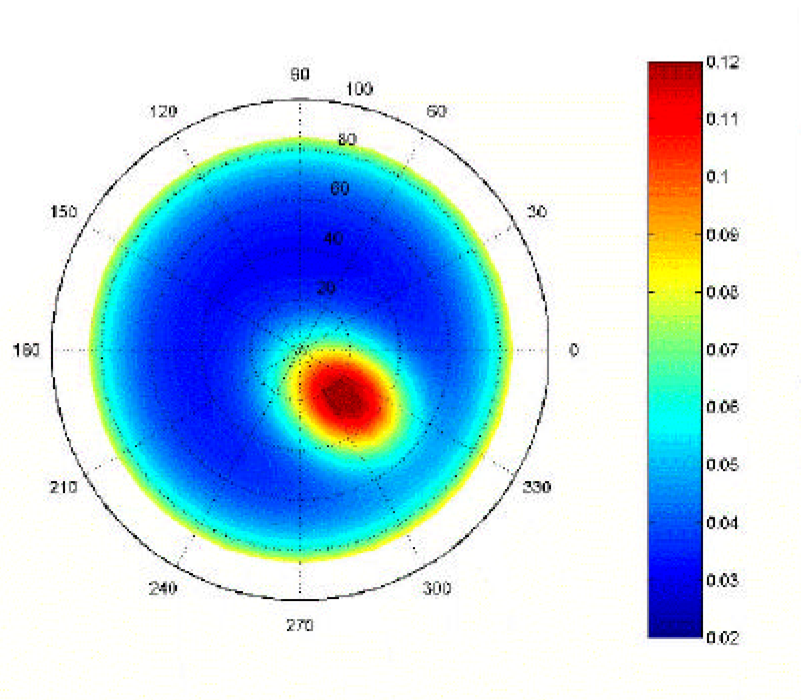
This is a daisy flight pattern for the OV-10. It would be an easy pattern for pre-CLAMS flights around COVE, as the pilot need select only one guidepoint (the center), rather than 4 guidepoints (as for a real rectangular pattern). Rob Rivers said that re-selecting multiple guidepoints would be hard after takeoff; but picking one new guidepost in flight is easy. The OV-10 daisy pattern would be preferred for targets of opportunity, such as a clear patch on a cloudy day.



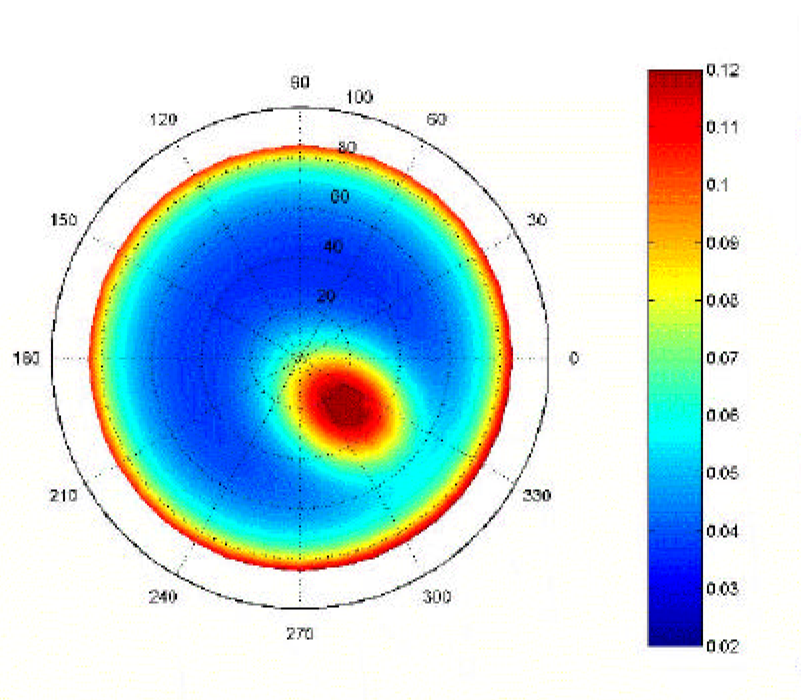
Simulated reflectance for July 10, 2001 local noon.

Total Aerosol Optical Thickness (AOT) is 0.1 at 550 nm. Sensor's height is at 20m (a) and 600m (b) respectively. AOT between surface and sensor is computed according to a 2km exponential profile for aerosol. AOT between surface and 20m and 600m are 0.001 and 0.026, respectively.

(a)



(b)



Simulated reflectance for July 10, 2001 local noon

Total Aerosol Optical Thickness (AOT) is 0.5 at 550 nm. Sensor's height is at 20m (a) and 600m (b) respectively. AOT between surface and sensor is computed according to a 2km exponential profile for aerosol. AOT between surface and 20m and 600m are 0.005 and 0.13.